HITACHI

HITACHI SPLIT-UNIT AIR CONDITIONER INSTALLATION MANUAL

Indoor Unit		Outdoor Unit
RAS-X10HAK	+	RAC-X10HAK
RAS-X13HAK	+	RAC-X13HAK

- Carefully read through the procedures of proper installation before starting installation work.
- The sales agent should inform customers regarding the correct operation of installation.

Tools Needed For Installation Work

(◉ mark is tool exclusive use for R410A) • ⊕ ⊖ Screwdriver • Measuring Tape • Knife • Saw • Pipe Cutter • Hexagonal Wrench Key (4mm) • Power Drill (ø65~ø80mm) • Vacuum Pump • Pliers or Wrench • Torque Wrench ◉ Vacuum Pump Adaptor ◉ Flare Tool ◉ Gas Leakage Detector ◉ Manifold Valve ◉ Charge Hose

SAFETY PRECAUTION

- Read the safety precautions carefully before operating the unit.
- The contents of this section are vital to ensure safety. Please pay special attention to the following sign.

⚠ **WARNING.....Incorrect methods of installation may cause death or serious injury.** ⃠ **This sign indicates prohibition.**

⚠ **CAUTION.....Improper installation may result in serious consequence.**

Be sure that the unit operates in proper condition after installation. Explain to customer the proper operation and maintenance of the unit as described in the user's guide. Ask customers to keep this installation manual together with the instruction manual.

⚠ WARNING

- Please request your sales agent or qualified technician to install your unit. Water leakage, short circuit or fire may occur if you do the installation work yourself.
- Please observe the installation stated in the installation manual during the process of installation. Improper installation may cause water leakage, electric shock and fire.
- Make sure that the units are mounted at locations which are able to provide full support to the weight of the units. If not, the units may collapse and impose danger.
- Observe the rules and regulations of the electrical installation and the methods described in the installation manual when dealing with the electrical work. Use cables which are approved official in your country. Be sure to use the specified circuit. A short circuit and fire may occur due to the use of low quality wire or improper work.
- Be sure to use the specified cables for connecting the indoor and outdoor units. Please ensure that the connections are tight after the conductors of the wire are inserted into the terminals to prevent the external force is being applied to the connection section of the terminal base. Improper insertion and loose contact may cause over-heating and fire.
- Please use the specified components for installation work. Otherwise, the unit may collapse or water leakage, electric shock, fire or stronger vibration may occur.
- Be sure to use the specified piping set for R410A. Otherwise, this may result in broken copper pipes or faults.
- When installing or transferring an air conditioner to another location, make sure that air other than the specified refrigerant (R410A) does not enter the refrigeration cycle. If other air should enter, the pressure level of the refrigeration cycle may increase abnormally which could result in a rupture and injury.
- Be sure to ventilate fully if a refrigerant gas leak while at work. If the refrigerant gas comes into contact with fire, a poisonous gas may occur.
- After completion of installation work, check to make sure that there is no refrigeration gas leakage. If the refrigerant gas leaks into the room, coming into contact with fire in the fan-driven heater, space heater, etc., a poisonous gas may occur.
- Unauthorized modifications to the air conditioner may be dangerous. If a breakdown occurs please call a qualified air conditioner technician or electrician. Improper repairs may result in water leakage, electric shock and fire, etc.
- Be sure to connect the earth line from the power supply wire to the outdoor unit and between the outdoor and indoor unit. Do not connect the earth line to the gas tube, water pipe, lighting rod or the earth line of the telephone unit. Improper earthing may cause electric shocks.
- When finishing the refrigerant collection (pumping down), stop the compressor and then remove the coolant pipe. If you remove the refrigerant pipe while the compressor is operating and the service valve is released, air is sucked and a pressure in the freezing cycle system will build up steeply, causing an explosion or injury.
- When installing the unit, be sure to install the refrigerant pipe before starting the compressor. If the refrigerant pipe is not installed and the compressor is operated with the service valve released, air is sucked and the pressure level of the refrigeration cycle may increase abnormally which could result in a rupture and injury.

⚠ CAUTION

- A circuit breaker must be installed in the house distribution box for the direct connected power supply cables to the outdoor unit. In case of other installations a main switch with a contact gap or more than 3mm has to be installed. Without a circuit breaker, the danger of electric shock exists.
- Do not install the unit near a location where there is flammable gas. The outdoor unit may catch fire if flammable gas leaks around it.
- Please ensure smooth flow of water when installing the drain hose. Improper installing may wet your funiture.
- An IEC approved power cord should be used.

THE CHOICE OF MOUNTING SITE (Please note the following matters and obtain permission from customer before installation).

INDOOR UNIT

⚠ WARNING

- The unit should be mounted at stable, non-vibratory location which can provide full support to the unit.

⚠ CAUTION

- No nearby heat source and no obstruction near the air outlet is allowed.
- The clearance distances from top, right and left are specified as ⇔ in figure below.
- The location musteb convenient for water drainage and pipe connection with the outdoor unit.
- Do not install at a location where there is flammable gas, steam, oil and smoke. There is a risk of fire, explosion, deterioration of resin and/or damage.
- To avoid interference from noise, please place the unit and its remote controller at least 1m from the radio and television.
- To avoid any error in signal transmission from the remote controller, please put the controller far away from high-frequency machines and high-power wireless systems.
- Lighting fixtures with electronic starters may shorten the reception distance and may even interfere with the signal being received.
- The installation height should be at least 2.3m or more from the floor.

OUTDOOR UNIT

⚠ WARNING

- The outdoor unit must be mounted at a location which can support heavy weight. Otherwise, noise and vibration will increase.

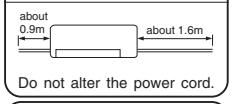
⚠ CAUTION

- Do not expose the unit under direct sunshine or rain. Besides, ventilation must be good and clear of obstruction.
- The air blown out of the unit should not point directly to animals or plants.
- The clearances of the unit from top, left, right and front are specified as ⇔ in figure below. At least two sides must be clear for ventilation.
- Be sure that the hot air blown out of the unit and noise do not disturb the neighbourhood.
- Place not exposed to strong wind. Particularly on the rooftop of a building, strong wind blows and the outdoor unit may be damaged.
- Do not install at a location where there is flammable gas, steam, oil and smoke.
- The location must be convenient for water drainage.
- Place the outdoor unit and its connecting cord at least 1m away from the antenna or signal line of television, radio or telephone. This is to avoid noise interference.
- Do not install the indoor unit in a place where small animals may build their nests. If small animal goes inside the unit and touches the electrical parts, failure of the unit, smoke or fire may be caused. Request your customer to keep the surrounding of the unit clean.

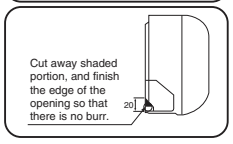
Names of Indoor Components

No	Component's Name	Qty
①	Mounting Plate	1
②	Screw for Mounting Plate (4.1x32)	6
③	AAA Size Battery	2
④	Remote Controller	1
⑤	Bush (Only RAC-X13HAK)	1
⑥	Drain pipe	1
⑦	Heat insulating materials	1

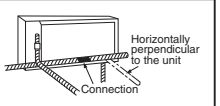
The Length of Indoor Unit Power Cord



Do not alter the power cord.

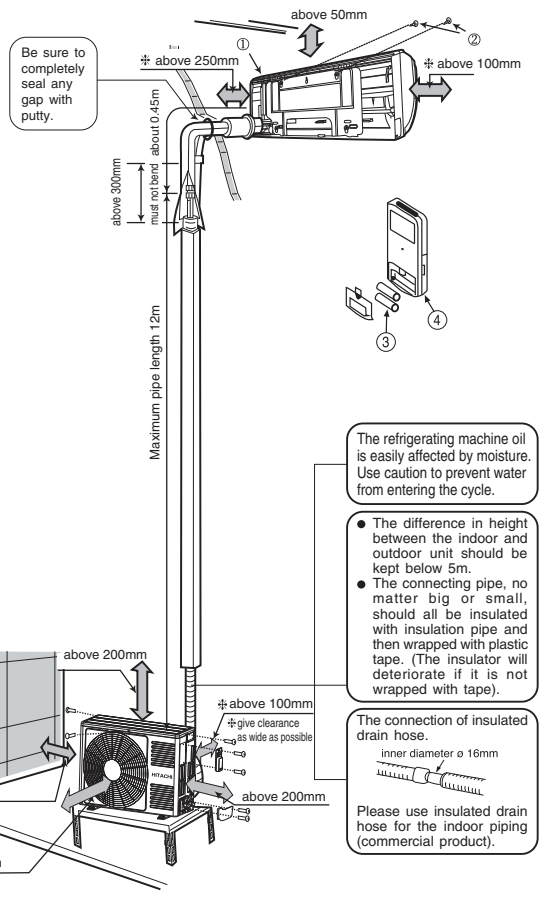


Direction of Piping



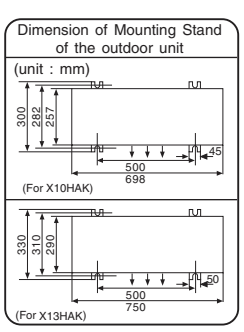
There are 4 directions allowed, namely, horizontally perpendicular to the unit, vertically down from right, horizontally out from right and horizontally out to left.
Don't form the piping downward at the left of the unit.

Figure showing the Installation of Indoor and Outdoor Unit.


Be sure to completely seal any gap with putty.
above 50mm
above 250mm
above 100mm
above 0.45m
above 300mm
must not bend
Maximum pipe length 12m
above 200mm
above 100mm
give clearance as wide as possible
above 300mm
above 200mm
above 700mm
The refrigerating machine oil is easily affected by moisture. Use caution to prevent water from entering the cycle.
The difference in height between the indoor and outdoor unit should be kept below 5m.
The connecting pipe, no matter big or small, should all be insulated with insulation pipe and then wrapped with plastic tape. (The insulator will deteriorate if it is not wrapped with tape).
The connection of insulated drain hose.
inner diameter ø 16mm
Please use insulated drain hose for the indoor piping (commercial product).

※ Items ⑤ & ⑥ are included in the package of the outdoor unit.

Dimension of Mounting Stand of the outdoor unit



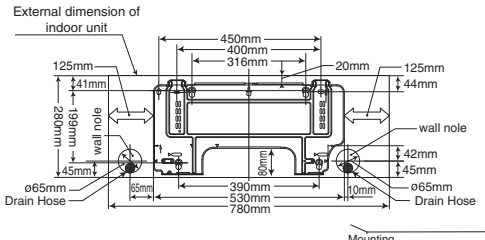
1 Installation of Mounting Plate, Wall Penetration and Installation of Protection Pipe

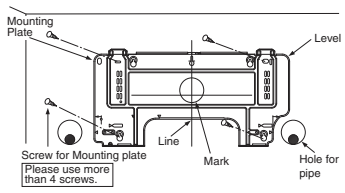
⚠ CAUITON

- The draining of the water container inside the indoor unit can be done from the left. Therefore the mounting plate must be fixed horizontally or slightly tilted towards the side of drain hose. Otherwise, condensed water may overflow the water container.

Direct Mounting On The Wall

- Please use hidden beams in the wall to hold the mounting plate.

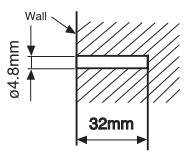




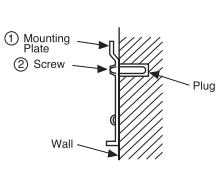
Procedures of Installation and Precautions

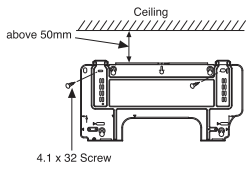
- Procedures to fix the mounting plate.

1. Drill holes on wall. (As shown below)



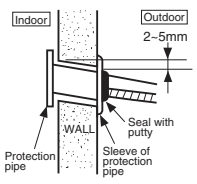
2. Fix the mounting plate on wall with 4.1 x 32 screw (As shown in figure below)





Wall Penetration and Installation of Protection Pipe

- Drill a ø 65mm hole on wall which is slightly tilted towards the outdoor side. Drill the wall at a small angle.
- Cut the protection pipe according to the wall thickness.
- Empty gap in the sleeve of protection pipe should be completely sealed with putty to avoid dripping of rain water into the room.



⚠ CAUITON

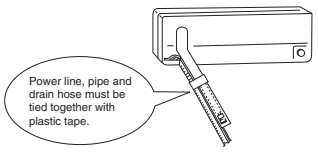
Be sure that the wire is not in contact with any metal in the wall. Please use the protection pipe as wire passing through the hollow part of the wall so as to prevent the possibility of damaged by mouse.

2 Installation of the Indoor Unit

VERTICALLY DOWNWARD PIPING

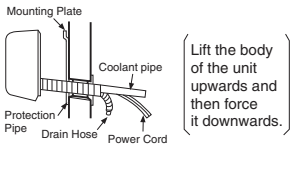
Preparation

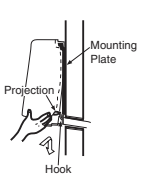
- Connect power cord.
- Pull out the pipe, power cord and drain hose.



Installation

- The upper part of the indoor unit is hanged on the mounting plate.
- The projection at the lower part of the indoor unit is hooked onto the mounting plate.





⚠ CAUITON

Please pull the lower part of the indoor unit outwards to check if the unit is hooked onto the mounting plate. Improper installation may cause vibration and noise.

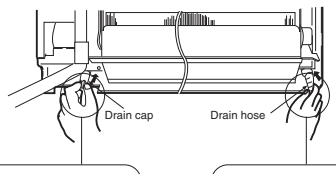
HORIZONTAL PIPING

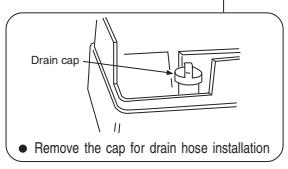
Preparation

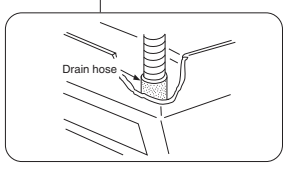
Change of Drain Hose and Installation Procedures.

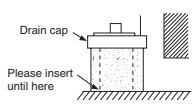
- Exchange the location of drain hose and drain cap during horizontal piping as shown in figure below. Be sure to plug in the drain hose until the insulating material folds upon itself.

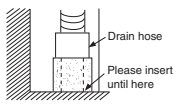
- Please use pliers to pull out the drain cap. (This is an easier way to remove the drain cap).









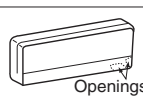


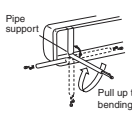
⚠ CAUITON

Condensed water may leak out if not inserted properly.

HORIZONTAL & DOWNWARD PIPING – MAKING OPENINGS

- During horizontal or downward piping, use a knife to cut openings as shown in figure. Then smoothen the edges of openings with a file.

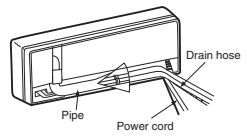


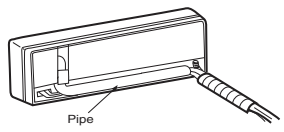


- Transform the piping while holding down the lower portion of pipe-support by hand.

INSTALLATION OF COOLANT PIPES AFTER CONNECTION

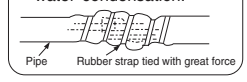
- The coolant pipes should be adjusted to fit into the hole on the wall and then ready for further connection.
- The terminals of 2 connected pipes must be covered with insulator used for terminal connection.
- Connect the power cord.
- After adjustment, fit the power cord and pipes into the space available under the indoor unit.





⚠ CAUITON

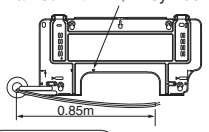
- The rubber strap used for fixing the insulator should not be tied with great force. Otherwise, this will damage heat insulation and causes water condensation.



THE CONNECTION OF COOLANT PIPE DURING THE INSTALLATION OF INDOOR UNIT

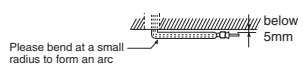
Preparation To Install Coolant Pipes

- Coolant pipes and power cord must be tied together.
- The front part of the coolant pipes are at locations marked with " ▽ " symbol.



⚠ CAUITON

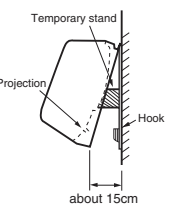
- Please fix in the plastic core after flaring to avoid plastic chips entering the pipes.

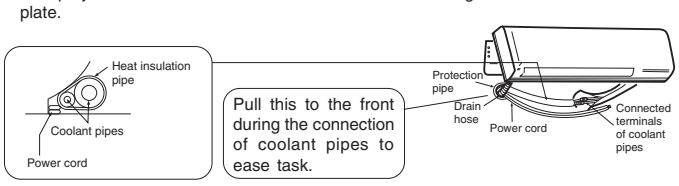


Installation

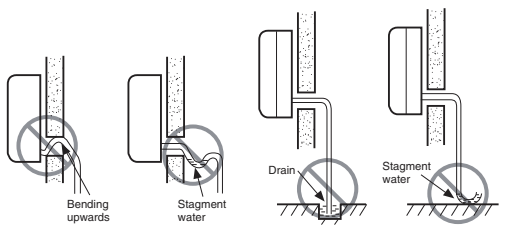
Hang the indoor unit onto the mounting plate. Use the temporary stand at the back of the indoor unit to push its lower part 15cm forwards.

- Place the drain hose through the hole on the wall.
- Insulate the connecting portion of coolant pipe with insulator.
- Connect the power cord.
- After adjustment, the power cord and coolant pipes are placed into the space available under the indoor unit.
- The projection of indoor unit must hook to the mounting plate.




Heat insulation pipe
Coolant pipes
Power cord
Pull this to the front during the connection of coolant pipes to ease task.
Protection pipe
Drain hose
Power cord
Connected terminals of coolant pipes

3 Installation of Drain Hose



⚠ CAUITON

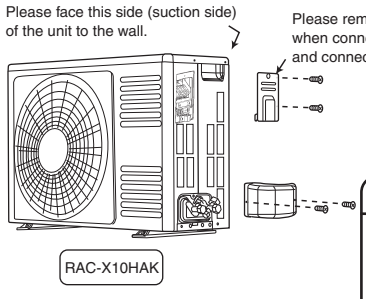
Be sure that the drain hose is not loosely connected or bent.

⚠ **CAUTION** You are free to choose the side (left or right) for the installation of drain hose. Please ensure the smooth flow of condensed water of the indoor unit during installation. (Carelessness may result in water leakage.)

INDOOR UNIT

OUTDOOR UNIT

- Please mount the Outdoor unit of stable ground to prevent vibration and increase of noise level.
- Decide the location for piping after sorting out the different types of pipe available.
- When removing side cover, please pull the handle after undoing the hook by pulling it downward. Reinstall the side cover in the reverse order of the removal.

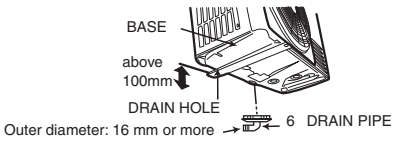

Please face this side (suction side) of the unit to the wall.
Please remove terminal cover when connecting the piping and connecting cord.
RAC-X10HAK

⚠ CAUTION

- Do not touch the suction port, bottom surface, or aluminum fin of the outdoor unit.
  Failure to do so may cause an injury.

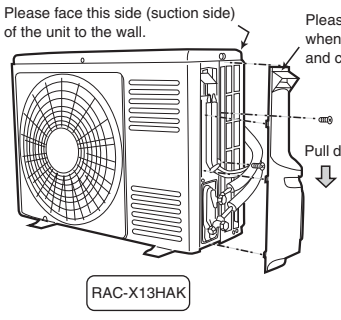
CONDENSED WATER DISPOSAL OF OUTDOOR UNIT

- There is holes on the base of Outdoor unit for condensed water to exhaust.
- In order to flow condensed water to the drain, the unit is installed on a stand or a block so that the unit is 100mm above the ground as shown figure. Join the drain pipe to one hole.
- After installation, check whether the drain pipe clings to the base firmly.



- Install the outdoor unit horizontally and make sure that condensate drains away.
- In case of using in chilly area
  Especially, in case that there are many snows by very cold in chilly area, condensed water freezes on the base and may result not to drain. In this case, please remove the bush and the drain pipe at the bottom of unit. (Left and center near discharge portion of air, each 1 place). It becomes smooth drain.
  Ensure that the distance from the drain hole to the ground is 250 mm or more.

- Please mount the Outdoor unit of stable ground to prevent vibration and increase of noise level.
- Decide the location for piping after sorting out the different types of pipe available.
- When removing side cover, please pull the handle after undoing the hook by pulling it downward. Reinstall the side cover in the reverse order of the removal.

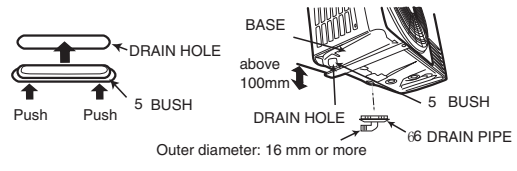

Please face this side (suction side) of the unit to the wall.
Please remove side cover when connecting the piping and connecting cord.
Pull downward
RAC-X13HAK

⚠ CAUTION

- Do not touch the suction port, bottom surface, or aluminum fin of the outdoor unit.
  Failure to do so may cause an injury.

CONDENSED WATER DISPOSAL OF OUTDOOR UNIT

- There is holes on the base of Outdoor unit for condensed water to exhaust.
- In order to flow condensed water to the drain, the unit is installed on a stand or a block so that the unit is 100mm above the ground as shown figure. Join the drain pipe to one hole.
- Cover the drain hole with a bush. To install the bush, put it on the drain hole as shown in the figure and press the both sides of the bush to fit into the hole.
  After installation, check whether the drain pipe and bush cling to the base firmly.



- Install the outdoor unit horizontally and make sure that condensate drains away.
- In case of using in chilly area
  Especially, in case that there are many snows by very cold in chilly area, condensed water freezes on the base and may result not to drain. In this case, please remove the bush and the drain pipe at the bottom of unit. (Left and center near discharge portion of air, each 1 place). It becomes smooth drain.
  Ensure that the distance from the drain hole to the ground is 250 mm or more.

INSTALLATION OF COOLANT PIPES AND AIR REMOVAL

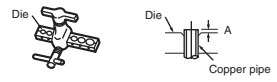
1 Preparation of Pipe

- Use a pipe cutter to cut the pipe and remove burr.

⚠ CAUTION

- **Remove burr**
  If burr is not removed, it may cause leakage.
- **Point the side to be trimmed downwards during trimming to prevent copper chips from entering the pipe.**

- Before flaring,please put on the flare nut.

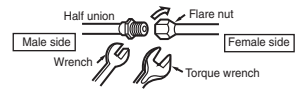


※**Please use exclusive tool for refrigerant R410.**

Outer Diameter (ø)	A (mm) Rigid Flaring Tool	
	For R410A tool	For R22 tool
6.35 (1/4")	0~0.5	1.0
9.52 (3/8")	0~0.5	1.0

2 Pipe Connection

- Remove the flare nut from the pipe of the indoor unit by removing the flare nut (female side) with a spanner while holding down the half union (male side) with a spanner.
- Do not crush the pipe while bending it.
- Apply refrigerant oil on the connection part. After carrying out the center alignment and manual tightening of the flare nut, tighten the flare nut securely with a torque wrench (spanner).



* Tightening torque must be as shown in the table below.

		Outer diameter of p pe (ø)	Torque N•m (kgf•cm)
Small diameter side		6.35 (1/4")	13.7~18.6 (140~190)
Large diameter side		9.52 (3/8")	34.3~44.1 (350~450)
Valve head cap	Small diameter side	6.35 (1/4")	19.6~24.5 (200~250)
	Large diameter side	9.52 (3/8")	19.6~24.5 (200~250)
Valve core cap			12.3~15.7 (125~160)

INSTALLATION OF COOLANT PIPES AND AIR REMOVAL

⚠ CAUTION

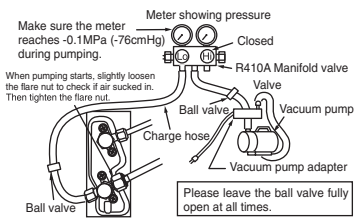
- **When removing flare nut of the indoor unit, first remove the nut of small diameter side.**
  Otherwise the nut of big diameter side will fly out.
- **Prevent water from entering into the piping when connecting.**
- **Be sure to tighten the flare nut to the specified torque with a torque wrench.**
  If the flare nut is overtightened, it may split after sometime and may cause refrigerant leak.
- **When using a control valve, make sure that the packing is not deteriorated and avoid excessive tightening of the handle. Otherwise, gas may leak from the service valve.**

3 Removal Of Air From The Pipe And Gas Leakage Inspection

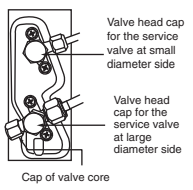
AIR REMOVAL

From the viewpoint of global environment protection, air purge type should be vacuum pump method.

2 ● Fully tighten the " Hi " shuttle of the manifold valve and completely unscrew the "Lo" shuttle. Run the vacuum pump. (Adapter is switched on)
● After pumping for about 10 -15 minutes, completely loosen the " Lo " shuttle and switch off the vacuum pump . (Adapter is switched off)

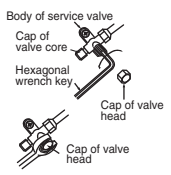

Meter showing pressure
Make sure the meter reaches -0.1MPa (-76cmHg) during pumping.
Closed
R410A Manifold valve
When pumping starts, slightly loosen the flare nut to check if air sucked in. Then tighten the flare nut.
Valve
Ball valve
Vacuum pump
Charge hose
Vacuum pump adapter
Ball valve
Please leave the ball valve fully open at all times.

1 ● Remove the valve head cap of the service valve.
● Remove the cap of valve core and connect the charge hose.
● Connect the vacuum pump adapter to the vacuum pump and connect the charge hose to the adapter.


Valve head cap for the service valve at small diameter side
Valve head cap for the service valve at large diameter side
Cap of valve core

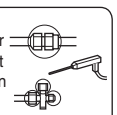
3 ● Loosen the spindle of the service valve with small diameter by 1 / 4 turn and tighten the spindle immediately after 5 to 6 seconds.
● Remove the charging hose from the service valve.

4 ● Unscrew the spindle of both the service valves in anticlockwise direction to allow the flow of refrigerant (unscrew halfway).
● Tighten the cap of valve head. Check and make sure that there is no gas leakage.



Gas Leakage Inspection

Please use gas leakage detector to check if leakage occurs at connection of Flare nut as shown on the right.



If gas leakage occurs , further tighten the connection to stop leakage. (Be sure to use R410A detector.)

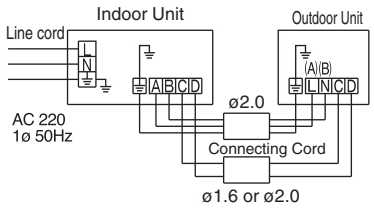
Works to be done when transferring or removing air conditioner

From the viewpoint of global environment protection, refrigerant should be recovered (pumped down) when the air conditioner is transferred or removed.

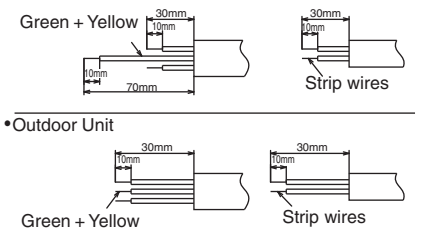
1 Perform force-cooling operation (refer to "Force-cooling operation" on page 12) for about 5 minutes as a preliminary operation.
2 Tighten the spindle of the service valve at small diameter side in clockwise direction.
3 Continue the force-cooling operation for another 1-2 minutes, and then tighten the spindle of the service valve at large diameter side in clockwise direction.
4 Stop the force-cooling operation.

CONNECTION OF POWER CORD

Procedures of Wiring

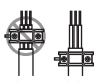


Detail of Cutting the Connecting Cord



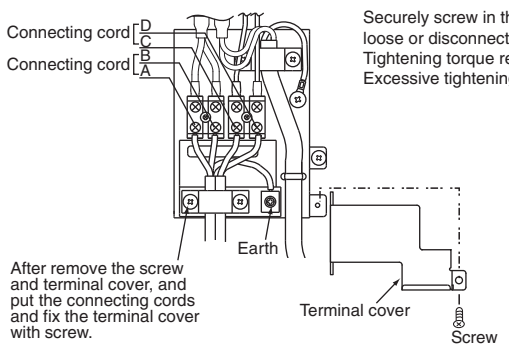
⚠ WARNING

- If the supply cord is damaged, it must be replaced by a special cord (Maker's service parts) available from the manufacturer or its service agent.
- The naked part of the wire core should be 10mm fix it to the terminal tightly. Then try to pull the individual wire to check if the contact is tight. Improper insertion may burn the terminal.
- Be sure to use only wire specified for the use of air-conditioner.
- Please refer to the manual for wire connection, the wiring technique should meet the standard of the electrical installation.
- Leave some space in the connecting cord for maintenance purpose and be sure to secure it with the cord band.
- Secure the connecting cord along the coated part of the wire using the cord band. Do not exert pressure on the wire as this may cause overheating or fire.
- There is a AC voltege of 220V between the A and B terminals. Therefore, before servicing, be sure to remove the plug from the AC outlet.



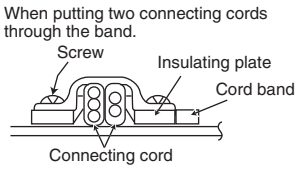
Wiring Of The Indoor Unit

- For wire connection of the Indoor unit, you need to remove the front cover, the low cover under the body of the unit and terminal cover.
- Remove the cover from the terminal base and screw the cable.



Securely screw in the power cord and connecting cord so that it will not get loose or disconnect.
Tightening torque reference value: 1.2 to 1.6 N·m (12 to 16 kgf·cm)
Excessive tightening may damage the interior of the cord requiring replacement.

When putting two connecting cords through the band.

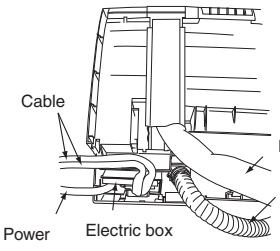


⚠ WARNING

After wiring the indoor unit, make sure to reattach the terminal cover.

CONNECTION OF POWER CORD

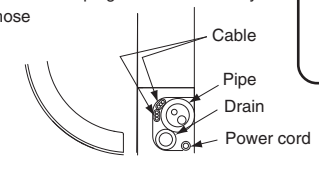
- Wiring for the horizontal piping from the right side.



Form the cable properly so that the low cover won't touch the cable in installation.

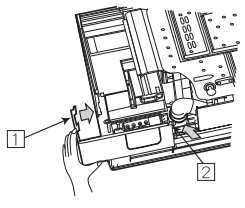
Not to interfere with the drain hose, fold the cable at the drain hose side of the electric box as shown in the left figure, and pass the cable just over the electric box and pull it out.

Piping and drain hose layout



Method to remove the low cover

- Pull at the 1 and 2 in the directionsas shown by arrows to remove the cover.



Wiring of the Outdoor Unit

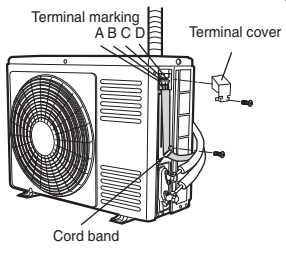
Please remove the side cover and terminal cover for wiring connection.

⚠ WARNING

- **The connecting cord must be fix with cord band**
  Otherwise rain water may enter and cause short circuit. Besides, an external forcemay apply to the connection part of the connecting cord and could result in heat and fire.
- **The terminal cover and side cover must be installed after work is done.**

⚠ CAUTION

- **Outdoor supply cords shall not be lighter than polychloroprene sheathed flexible cord with code designation 60245 IEC 57.**



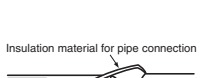
IMPORTANT

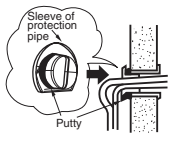
Fuse Capacity
16A time-delay fuse

FINAL STAGE OF INSTALLATION

1 Insulation And Maintenance Of Pipe Connection

- The connected terminals should be completed sealed with heat insulator and then tied up with rubber strap.
- Please tie the pipe and power line together with plastic tape as shown in the figure of installation of both the indoor and outdoor units. Then fix their position with holders.
- To enchance the heat insulation and to prevent water condensation, please cover the outdoor part of the drain hose and pipe with insulation pipe.
- Completely seal any gap with putty.





2 Earth Line And Circuit Breaker

⚠ CAUITON

- The earth line terminal of the outdoor unit is below the service valve.
- To avoid short circuit, it is necessary to install circuit breaker depending on the mounting location of the unit.
- Do not place earth line near the following objects:
  (1) Water pipe
  (2) Gas pipe — There is danger of catching fire.
  (3) The earth line of lightning conductor and telephone — short circuit may occur during lightning.

3 Power Source And Operation Test

Power Source

⚠ WARNING

- Do not alter the plug of power cord.
  Do not make extension to the power cord.

⚠ CAUTION

- Please use a new socket. Accident may occur due to the use of old socket because of poor contact.
- Please plug in and then remove the plug for 2 – 3 times. This is to ensure that the plug is completely plugged into the socket.
- Keep additional length for the power cord and do not render the plug under external force as this may cause poor contact.
- Do not fix the power cord with U-shape nail.

Operation Test

- Please ensure that the air conditioner is in normal operating condition during the operation test.
- Explain to your customer the proper operation procedures as described in the user's manual.